General

Guideline Title

Best evidence statement (BESt). Speech therapist directed use of computer assisted cognitive rehabilitation (CACR) for patients with acquired brain injury.

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BESt). Speech therapist directed use of computer assisted cognitive rehabilitation (CACR) for patients with acquired brain injury. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2011 Sep 13. 6 p. [12 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of the evidence (1aâ€'5b) are defined at the end of the "Major Recommendations" field.

It is recommended that pediatric patients with acquired brain injury use computer-assisted cognitive rehabilitation when directed by a speech-language pathologist to decrease impairment in:

- Processing speed (Bangirana et al., 2009 [2b]; Kesler, Lacayo, & Jo, 2011 [4a])
- Attention (Thornton & Carmody, 2008 [1b]; Cicerone et al., 2011 [1b]; Bangirana et al., 2009 [2b]; Thorell et al., 2009 [2b]; Kesler, Lacayo, & Jo, 2011 [4a]; Chen et al., 1997 [4b])
- Working memory (Thorell et al., 2009 [2b]; Klingberg et al., 2005 [2b]; Kesler, Lacayo, & Jo, 2011 [4a]; Chen et al., 1997 [4b])
- Inhibition (Thorell et al., 2009 [2b]; Klingberg et al., 2005 [2b])
- Memory (Thornton & Carmody, 2008 [1b]; Cicerone et al., 2011 [1b]; Bangirana et al., 2009 [2b]; Dou et al., 2006 [2b]; Lloyd, Riley, & Powell, 2009 [2b]; Bergquist et al., 2009 [2b]; Sweeney et al., 2010 [2b]; Kesler, Lacayo, & Jo, 2011 [4a]; Chen et al., 1997 [4b])
- Problem solving (Thornton & Carmody, 2008 [1b]; Klingberg et al., 2005 [2b]; Man et al., 2006 [2b]; Chen et al., 1997 [4b])

Definitions:

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local consensus

†a = good quality study; b = lesser quality study

Note: See the original guideline document for further information about the dimensions used to judge the strength of the evidence.

Table of Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	There is consensus that benefits clearly outweigh risks and burdens (or vice versa for negative recommendations).
It is recommended that… It is recommended that… not…	There is consensus that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation…	
Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.	
1. Grade of the body of evidence 2. Safety/harm 3. Health benefit to the patients (direct benefit) 4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time) 5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis) 6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]) 7. Impact on morbidity/mortality or quality of life	

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Sustained acquired brain injury (ABI), including:

- Traumatic brain injury (TBI)
- Brain tumor

- Arteriovenous malformation (AVM)
- Seizure disorder
- Meningitis
- Encephalitis
- Cerebrovascular accident (CVA)
- Hydrocephalus

Guideline Category

Assessment of Therapeutic Effectiveness

Rehabilitation

Treatment

Clinical Specialty

Family Practice

Neurology

Pediatrics

Speech-Language Pathology

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Speech-Language Pathologists

Guideline Objective(s)

To evaluate, among pediatric patients with acquired brain injury, if speech therapist directed use of computer-assisted cognitive rehabilitation (CACR) in addition to traditional rehabilitative cognitive-linguistic speech therapy versus traditional rehabilitative cognitive-linguistic speech therapy alone decreases impairment and improve functional independence

Target Population

Inclusion: Pediatric patients (ages 3 to 21 years) that have sustained acquired brain injury (ABI), including traumatic brain injury (TBI), brain tumor, arteriovenous malformation (AVM), seizure disorder, meningitis, encephalitis, cerebrovascular accident (CVA), and hydrocephalus

Exclusion: Patients with neurological impairments that are hereditary; patients with psychological diagnosis prior to injury; patients with severe visuospatial deficits which impact their ability to complete tasks on a computer screen

Interventions and Practices Considered

1. Computer-assisted cognitive rehabilitation

    - Captain's Log cognitive training software
    - Lumos Labs, Incorporated software
    - RoboMemo software (Cogmed)
    - The Bracy Process Approach
2. Traditional rehabilitative cognitive-linguistic speech therapy
    - Errorless learning
    - Compensatory strategies
    - Personal instruction
3. Other methods of confirming results
    - Neuropsychological measures (e.g., Mayo-Portland Adaptability Inventory-4)
    - Functional magnetic resonance imaging
    - Electroencephalogram biofeedback

Major Outcomes Considered

- Changes in processing speed
- Changes in attention level
- Changes in working memory and overall memory
- Changes in inhibition
- Changes in problem solving

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Date range: 1995-April 2011

Keywords: brain/head injury, neurological injury, acquired/traumatic brain injury, brain tumor, stroke, CVA, speech therapy/pathology, computer, computer assisted cognitive rehabilitation, cognitive rehab/rehabilitation, child/children

Databases: CINAHL, Ovid, Medline, PubMed, Cochrane Library, Scopus, EBSCO, ASHA, PsycINFO, ERIC, Google Scholar, National Guideline Clearinghouse (www.guideline.gov)

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
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Note: See the original guideline document for further information about the dimensions used to judge the strength of the evidence.

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Table of Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	There is consensus that benefits clearly outweigh risks and burdens (or vice versa for negative recommendations).
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Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.	
1. Grade of the body of evidence 2. Safety/harm 3. Health benefit to the patients (direct benefit)	

Strength	Definition

4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)
5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis)
6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])
7. Impact on morbidity/mortality or quality of life

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

This Best Evidence Statement has been reviewed against quality criteria by 2 independent reviewers from the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence Collaboration.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Bangirana P, Giordani B, John CC, Page C, Opoka RO, Boivin MJ. Immediate neuropsychological and behavioral benefits of computerized cognitive rehabilitation in Ugandan pediatric cerebral malaria survivors. J Dev Behav Pediatr. 2009 Aug;30(4):310-8. PubMed

Bergquist T, Gehl C, Mandrekar J, Lepore S, Hanna S, Osten A, Beaulieu W. The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury. Brain Inj. 2009 Sep;23(10):790-9. PubMed

Chen SH, Thomas JD, Glueckauf RL, Bracy OL. The effectiveness of computer-assisted cognitive rehabilitation for persons with traumatic brain injury. Brain Inj. 1997 Mar;11(3):197-209. PubMed

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Dou ZL, Man DW, Ou HN, Zheng JL, Tam SF. Computerized errorless learning-based memory rehabilitation for Chinese patients with brain injury: a preliminary quasi-experimental clinical design study. Brain Inj. 2006 Mar;20(3):219-25. PubMed

Kesler SR, Lacayo NJ, Jo B. A pilot study of an online cognitive rehabilitation program for executive function skills in children with cancer-related brain injury. Brain Inj. 2011;25(1):101-12. PubMed

Klingberg T, Fernell E, Olesen PJ, Johnson M, Gustafsson P, Dahlstrom K, Gillberg CG, Forssberg H, Westerberg H. Computerized training

of working memory in children with ADHD--a randomized, controlled trial. J Am Acad Child Adolesc Psychiatry. 2005 Feb;44(2):177-86. PubMed

Lloyd J, Riley GA, Powell TE. Errorless learning of novel routes through a virtual town in people with acquired brain injury. Neuropsychol Rehabil. 2009 Jan;19(1):98-109. PubMed

Man DW, Soong WY, Tam SF, Hui-Chan CW. Self-efficacy outcomes of people with brain injury in cognitive skill training using different types of trainer-trainee interaction. Brain Inj. 2006;20(9):959-70. [55 references] PubMed

Sweeney S, Kersel D, Morris RG, Manly T, Evans JJ. The sensitivity of a virtual reality task to planning and prospective memory impairments: group differences and the efficacy of periodic alerts on performance. Neuropsychol Rehabil. 2010 Apr;20(2):239-63. PubMed

Thorell LB, Lindqvist S, Bergman Nutley S, Bohlin G, Klingberg T. Training and transfer effects of executive functions in preschool children. Dev Sci. 2009 Jan;12(1):106-13. PubMed

Thornton KE, Carmody DP. Efficacy of traumatic brain injury rehabilitation: interventions of QEEG-guided biofeedback, computers, strategies, and medications. Appl Psychophysiol Biofeedback. 2008 Jun;33(2):101-24. [87 references] PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Decreased impairment and improved functional independence

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Implementation of the Guideline

Description of Implementation Strategy

Applicability Issues

- Proper education and training of computer-assisted cognitive rehabilitation for staff involved in the care of patients with acquired brain injury.
- Appropriate documentation tools are required to monitor use of Computer Assisted Cognitive Rehabilitation (CACR) during treatment and/or during home program.
- A valid and reliable outcome measure is needed to measure functional independence.

Implementation Tools

Audit Criteria/Indicators

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2011 Sept 13

Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

Source(s) of Funding

Cincinnati Children's Hospital Medical Center

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

Group/Team Leader: Katherine Baker, MA, CCC-SLP, Division of Speech Pathology, Outpatient Neurorehabilitation Team (ONRT)

Support personnel: Mary Ellen Meier, MS, RN, CPN Evidence-Based Practice Mentor, Center for Professional Excellence/Research and Evidence-Based Practice; Patti Besuner, MS, RN, CPN Evidence-Based Practice Mentor, Center for Professional Excellence/Research and Evidence-Based Practice

Financial Disclosures/Conflicts of Interest

Conflicts of interest were declared for each team member and no financial conflicts of interest were found.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Cincinnati Children's Hospital Medical Center Web site .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Availability of Companion Documents

The following are available:

- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2008 Jan. 1 p. Available from the Cincinnati Children's Hospital Medical Center Web site .
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 1 p. Available from the Cincinnati Children's Hospital Medical Center Web site .
- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2008 Feb 29. 1 p. Available from the Cincinnati Children's Hospital Medical Center Web site .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

In addition, suggested process or outcome measures are available in the original guideline document .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on March 28, 2012.

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